CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION
PUBLIC REPORT 2007-7

Active Ingredients: Copper Citrate Chelate and Copper Gluconate Chelate
Tracking ID Number 219917

DESCRIPTION OF ACTION

Applied Biochemists submitted an application for California registration of Algimycin PWF, EPA Reg. No. 7364-9-8959. Algimycin PWF is an algaecide/cyanobacteriocide labeled for use in potable water reservoirs, ponds, lakes, irrigation conveyance systems, ditches, canals, and laterals. Algimycin PWF contains the two active ingredients copper citrate chelate and copper gluconate chelate, which are formed as an integral part of the manufacturing process. Together they provide 5.0% copper in the formulation.

Algimycin PWF is a distributor registration of the GLB Pool and Spa product, Algimycin PLL-C, EPA Reg. No. 7364-9. Algimycin PLL-C was registered in California September 10, 1974, and was inactivated December 31, 1998. Data were not submitted to support the registration of Algimycin PLL-C in 1974. The U.S. Environmental Protection Agency (U.S. EPA) registered Algimycin PLL-C August 31, 1971.

DPR evaluated the product label and data for Algimycin PWF and found them acceptable to support conditional registration. Precautionary and first aid statements and other protective measures on the product label adequately mitigate the potential health risks to users. DPR does not expect significant adverse environmental impacts to result from registration of Algimycin PWF.

BACKGROUND

Registrant:	Applied Biochemists
Common name:	Copper citrate chelate Copper gluconate chelate
Chemical name:	Copper citrate chelate Copper gluconate chelate
Brand name:	Algimycin PWF
Uses:	Algaecide
Pests controlled:	Algae and cyanobacteria
Type of registration:	Conditional Registration

Algimycin PWF is a liquid formulation containing the active ingredients copper citrate chelate and copper gluconate chelate. The Algimycin PWF copper combination forms a complex that allows an increased amount of copper to remain in solution, thereby making copper more effective as an algaecide. Algimycin PWF is labeled for control of a broad range of algae and cyanobacteria in potable and irrigation water sources including reservoirs, lakes, ponds, and related water conveyance systems. The copper mode of action affects multiple cellular systems,

including disruption of electron transfer systems and alteration of membrane integrity. The Algimycin PWF label recommends use concentrations ranging from 0.06 ppm to 0.5 ppm active ingredient for control of 30 different genera of algae and cyanobacteria. The recommended use rates are dependent upon environmental conditions that are identified on the label. The conditions include the biomass present, the genera of algae or cyanobacteria present, intended water usage, and water flow rates.

SCIENTIFIC REVIEW

A. Chemistry

1. Product Chemistry**:** DPR evaluated the submitted chemistry studies for Algimycin PWF. The product chemistry data support registration of Algimycin PWF. The results are summarized in Tables 1.

Table 1. Physical and Chemical Properties of Algimycin PWF

Properties	Values
Physical state	Blue liquid
Odor	Slight, nondescript
Density (20 ^{o}C)	10.24 pounds/gal
pH	3.04
Specific gravity	1.229 @ 21 °C
Viscosity (22 °C)	2.71 cSt @ 22 °C
Storage stability	Stable for 1 year at ambient room temp
Corrosion characteristics	After 1 year at room temp, wall of a high-density polyethylene bottle softened and indented

2. Residues in Food and Animal Feed**:** Applied Biochemists did not submit residue data. In accordance with California Notice 2004-7, these data are no longer required.

3. Environmental Fate**:** Applied Biochemists did not submit environmental fate data. In accordance with the DPR Notice of Decisions dated August 16, 1987, environmental fate data pursuant to the Pesticide Contamination Prevention Act of 1985 are not required for inorganic compounds such as copper.

B. Toxicology

Applied Biochemists submitted adequate toxicology studies to conduct complete toxicological evaluations of Algimycin PWF. DPR evaluated the submitted data to determine the potential for adverse health effects. The product label adequately identifies the potential acute toxicity hazards indicated by the data reviewed. The first aid statements and PPE are adequate for the indicated acute toxicity hazards. The acute toxicity parameters for copper citrate chelate and copper gluconate chelate are summarized in Table 2.

Table 2. Summary of Acute Toxicity of Algimycin PWF

Type of Study	Acute Toxicity Values*	Acute Toxicity Category
Acute oral	LD_{50} > 500 mg/kg	III
Acute dermal	LD_{50} > 5000 mg/kg	IV
Acute inhalation	LC_{50} > 2.09 mg/l	IV
Primary eye irritation	N/A	III
Primary dermal irritation	N/A	IV
Dermal sensitization	N/A	Not a Sensitizer
Signal word	N/A	CAUTION

*Acute Toxicity Values expressed as:
LD_{50} = Lethal dose that kills 50% of the test population
LC_{50} = Lethal environmental concentration that kills 50% of the test population
N/A = Not applicable

DPR determined that copper citrate chelate and copper gluconate chelate can be grouped with other copper-containing compounds to fulfill the requirements of the Birth Defects Prevention Act (Food and Agricultural Code section 13121 et al.). Consequently, Birth Defects Prevention Act data are not required at this time. DPR prioritizes pesticide active ingredients for risk assessment based on the nature of the potential adverse health effects, number of potential adverse effects, number of species affected, no observable effect levels (NOELs), potential for human exposure, use patterns, and similar other factors. Based on these criteria, pesticides with the greatest potential for health problems are placed in high priority, with other chemicals being in moderate or low priority. The purpose of the risk assessment would be to appraise the potential for copper citrate chelate and copper gluconate chelate to cause adverse health effects in humans if exposed to the pesticide as a result of legal use. At this time copper citrate chelate and copper gluconate chelate have not been prioritized by DPR for risk assessment. Toxicity

information is not available for copper citrate chelate or copper gluconate chelate on DPR's website. As noted above, copper citrate chelate and copper gluconate chelate are grouped with the currently registered active ingredient, copper, for testing under the requirements of the Birth Defects Prevention Act.

C. Health & Safety

DPR's evaluation of the medical management information on the Algimycin PWF label and the acute toxicity study results indicate that the product label bears all of the required statements and warnings regarding safety to handlers and other persons who may be exposed to the pesticide. The product label bears an adequate First Aid statement. In addition, the product label warns users/handlers to avoid breathing spray mist, and requires handlers to wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. The instructions also direct handlers to wear protective eyewear, and to wear long-sleeved shirt and long pants, socks, shoes and gloves.

D. Fish & Wildlife

The registrant submitted fish and wildlife toxicity studies, including studies on bobwhite quail, mallard duck, rainbow trout, bluegill sunfish, and *Daphnia magna***.** The submitted data are adequate to characterize the toxicity to wildlife and aquatic animals from an environmental exposure**.** Table 3 on page 5 summarizes the results of these studies.

The data indicate that copper citrate chelate and copper gluconate chelate are relatively non-toxic to birds, moderately toxic to rainbow trout, and slightly toxic to bluegill sunfish and *Daphnia magna*. To mitigate hazards to aquatic organisms the Algimycin PWF label Environmental Hazards warning statement contains the following directions:

- Do not treat more than one-half of lake or pond at one time to avoid depletion of oxygen levels due to decaying vegetation. Allow one to two weeks between treatments for oxygen levels to recover.

- Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. Do not use in waters containing trout, goldfish, koi or other sensitive species if carbonate hardness is less than 50 ppm. Fish toxicity generally decreases when the hardness of the water increases. Do not contaminate water when disposing of equipment wastewaters. Consult your local state fish and game agency before applying this product to public waters. Permits may be required before treating such water.

Table 3. Summary of Fish & Wildlife Toxicity Values*

Test Animal	Type of Study	Acute Toxicity Value**	Relative Toxicity
Bobwhite quail	Acute oral dose	>2236 mg/kg LD_{50} 810 mg/kg NOEC	Relatively non-toxic
Bobwhite quail	Feeding (8 day)	>5620 ppm LC_{50} 5620 ppm NOEC	Relatively non-toxic
Mallard duck	Feeding (8 day)	>5620 ppm LD_{50} 5620 ppm NOEC	Relatively non-toxic
Rainbow trout	Water exposure (96 hrs)	1.7 ppm LC_{50} 0.71 ppb NOEC	Moderately toxic
Bluegill sunfish	Water exposure (96 hrs)	38.0 ppm LC_{50}	Slightly toxic
Daphnia magna	Water exposure (48 hrs)	14.61 ppm LC_{50}	Slightly toxic

* The test substance used for the studies was the technical active ingredient(s).
** Acute toxicity values expressed as:
LD_{50} = Lethal dose that kills 50% of the test population
LC_{50} = Lethal environmental concentration that kills 50% of the test population
NOEC = No observed effect concentration

E. Efficacy

In support of registration, Applied Biochemists submitted efficacy data demonstrating product efficacy against the green algae *Raphidocelis subcapitata* and *Pithophora* sp. and the cyanobacteria *Pseudoanabaena* sp. DPR determined that the submitted data, as well as data in the public domain, were adequate to support conditional registration of Algimycin PWF. The conditional registration is contingent upon the registrant's submission of data to support the label claims to control the phytoplankton *Cymbella,* the cyanobacteria *Nostoc,* and the green algae *Desmidium, Hawmatococcus, Ankistrodemus, Eudorina,* and *Pandorina*.

ALTERNATIVES

Algimycin PWF is a liquid algaecide providing control of a broad range of algae and cyanobacteria in potable and irrigation water sources including reservoirs, lakes, ponds and related water conveyance systems. A key advantage of Algimycin PWF is the chelate copper complex which provides improved stability to both heat and light giving an increased amount of copper in solution, making Algimycin PWF more effective as an algaecide. Also, Algimycin PWF is registered for use in potable water, can be used for swimming and domestic uses

immediately after chemical application, and fish from treated waters can be consumed immediately after application. A number of other active ingredients are registered as algaecides and cyanobacteriocides. However, an effective integrated pest management strategy requires the flexibility of a large number of comparable, but not exactly equivalent, pesticides in order to reduce the development of resistance.

CONCLUSION

DPR evaluated the product label and scientific data Applied Biochemists submitted to support the registration of Algimycin PWF. The label and data were found acceptable to support conditional registration. The acute health risks to human from exposure to copper citrate chelate and copper gluconate chelate are minimal due to its low mammalian toxicity. The precautionary and first aid statements on the product label, and the recommended protective measures mitigate potential health risks to persons who may be exposed to these pesticides. If a risk assessment conducted by DPR determines that exposure to copper citrate chelate and copper gluconate chelate may result in unacceptable margins of exposure, further restrictions will be placed on the use of copper citrate chelate and copper gluconate chelate at that time. When used in accordance with label directions, Algimycin PWF will be effective for the intended use.

Under the conditions of registration, Applied Biochemists must provide data to support the Algimycin PWF label claims to control certain phytoplankton, cyanobacteria and green algae. Conditional registration of Algimycin PWF is recommended for one year. If Applied Biochemists does not submit the required data within one year the registration for Algimycin PWF will not be renewed.